

Sub B1
Sub B2
tuning the output of at least one optical parametric oscillator to at least one absorption band of the first molecular substance [generating secondary radiation with at least one optical parametric oscillator]; and

directing at least a portion of the output of the at least one optical parametric oscillator tuned to the at least one absorption band of the first molecular substance [secondary radiation] into the chamber to [promote the reactivity of] dissociate the first molecular substance.

Sub B2
Sub B3
18. A method as defined in claim 14, wherein the step of tuning the output of at least one optical parameter oscillator [generating secondary radiation] comprises employing at least one optical parametric oscillator/laser (OPOL) including an optical pump source for generating pump radiation, and an OPOL material responsive to the pump radiation to generate laser radiation and responsive to the laser radiation to generate parametric optical radiation.

Sub B3
22. A method as defined in claim 15, further comprising the steps of directing residual first molecular substance released from the chamber into a second chamber, [generating secondary radiation with a second at least one optical parametric oscillator,] and directing at least a portion of the output of at least one optical parametric oscillator tuned to at least one absorption band of the

Q3
Sub B3
first molecular substance [secondary radiation] into the second chamber to dissociate the residual first molecular substance into at least two second molecular substances.

Q4
Sub B4
25. A method as defined in claim 17, wherein the wavelength of the output of the at least one optical parametric oscillator [secondary radiation] is within the region of approximately 3.0 microns.

Please add the following new claims:

Q5
Sub B5
27. (New) A method of performing a photochemical reaction comprising the following steps:

introducing a first molecular substance into a chamber;

tuning the output of at least one optical parametric oscillator to at least one predetermined wavelength corresponding to at least one absorption band of the first molecular substance; and

altering the vibrational distribution of the first molecular substance by directing the output of the at least one optical parametric oscillator into the first molecular substance and promoting molecular vibration approximately at the at least one predetermined wavelength to form a peak within the vibrational distribution of the first molecular substance at approximately the at least one predetermined wavelength and dissociate the first ~~molecular substance.~~

¹⁴
~~28.~~ (New) A method as defined in claim ¹³~~27~~, wherein the first molecular substance is methane which is dissociated into at least one second molecular substance including ethane.

¹⁴
~~29.~~ (New) A method as defined in claim ¹³~~27~~, further comprising the step of compressing the first molecular substance prior to introduction into the chamber.

AS cont.
Sub B6
~~30. (New) A method as defined in claim 27, further comprising the steps of directing residual first molecular substance released from the chamber into a second chamber, and altering the vibrational distribution of the first molecular substance within the second chamber by directing the output of at least one optical parametric oscillator tuned to at least one wavelength corresponding to at least one absorption band of the first molecular substance and promoting molecular vibration approximately at the at least one wavelength to form a peak within the vibrational distribution at the at least one wavelength and dissociate the first molecular substance.~~

¹⁵
~~31.~~ (New) A method as defined in claim ¹⁴~~28~~, wherein the at least one predetermined wavelength is selected from the group including approximately 3.313 microns and approximately 1.665 microns.

¹⁸
~~32.~~ (New) A method for performing a photochemical reaction, comprising the following steps:

p/ tuning the output of at least one optical parametric oscillator/laser to at least one absorption band of a molecular substance; and

p/ directing the output of the at least one optical parametric oscillator/laser into the molecular substance and dissociating the molecular substance.

Abuse
¹⁹
~~33.~~ (New) A method as defined in claim ¹⁸~~32~~, further comprising the steps of tuning the output of the at least one optical parametric oscillator/laser to both a primary absorption band and a molecular overtone of the molecular substance, and directing the output of the at least one optical parametric oscillator/laser into the molecular substance and dissociating the molecular substance.

²⁰
~~34.~~ (New) A method as defined in claim ¹⁹~~33~~, wherein the molecular substance is methane, and the output of the at least one optical parametric oscillator/laser is tuned to a primary absorption band of approximately 3.313 microns and a molecular overtone of approximately 1.665 microns.

Remarks

Claims 14-26 are elected with traverse pursuant to the